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TELEMEDICINE, A PATHWAY FOR UNVEILING NEW MODELS OF CLINICAL RELATIONSHIPS IN RESOURCE CONSTRAINED ENVIRONMENTS

Saba Ghulam Fareed[1], Mamoona Hashim[*2], Riffat Fatima[3], Sanober[4], Hafiza Laila Hashim Khan[5]

[1, *2,3,4,5]*Liaquat College of Medicine and Dentistry*

[*2]mamoonahashimkhan786@gmail.com

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Corresponding Author: *
Mamoona Hashim

Abstract

Introduction: *Telemedicine has emerged as a transformative approach in healthcare delivery, offering medical consultation and follow-up through information and communication technologies that transcend geographical barriers. Early experiences demonstrated its capacity to enhance healthcare access and care coordination for underserved or remote populations. As the field evolved, telemedicine became recognized not only as a technological innovation but also as an organizational and cultural shift within clinical practice, requiring integration into established care workflows.*

Methodology: *This is cross-sectional study done to assess the relationship between patients' perceptions of telehealth usability and their trust in physicians. Data was collected using an online questionnaire by including demographic questions along with the two validated scales Telehealth Usability Questionnaire TUQ and Trust in Physician Scale TIPS after taking ethical. The necessary sample size was 365, We included 385 individuals, in order to increase accuracy and account for potential incomplete answers.*

Results: *Thirty-six percent (n=118) of interviewees said they had used telehealth services. Users and non-users did not significantly differ in age (p=0.109), with the mean age being 24.1 ± 4.2 years. The distribution of genders was comparable among groups (p=0.945). Telehealth use was significantly correlated with educational attainment (p=0.001), and uptake was higher among higher income groups (p=0.035). The majority of participants had good to fair internet connectivity (77%), while smartphones accounted for 91.5% of all access devices. Females reported considerably higher levels of trust than males (p<0.001), with the mean trust in doctors score (TIPS) being 3.32 ± 0.49. With a mean TUQ score of 99.05 ± 29.29, telehealth usability was high and strongly positively correlated with trust (r=0.45, p<0.001). Although there were no statistically significant differences in usability scores by residence, there were significant differences by gender (p=0.013) and education (p=0.037). Overall, the results show that telehealth adoption is influenced by socioeconomic factors, high usability, and moderate trust.*

Conclusion: *this study highlights that telehealth is widely accepted for its accessibility, convenience, and usability, while patients' trust in their doctors is largely rooted in the belief that they are skilled and genuinely care for them.*

Introduction:

Telemedicine has emerged as a transformative approach in healthcare delivery, offering medical consultation and follow-up through information and communication technologies that transcend geographical barriers. Early experiences demonstrated its capacity to enhance healthcare access and care coordination for underserved or

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remote populations[1]. As the field evolved, telemedicine became recognized not only as a technological innovation but also as an organizational and cultural shift within clinical practice, requiring integration into established care workflows[2]. Systematic reviews have consistently shown that telemedicine can produce clinical outcomes comparable to traditional in-person care while improving efficiency and patient satisfaction across various conditions[3]. In pediatrics, for instance, telemedicine facilitates remote triage, chronic disease management, and parental counseling, reducing travel burdens and improving continuity of care[4]. Beyond clinical results, research has examined operational aspects such as provider workload and time allocation, emphasizing that telemedicine changes clinician time use and impacts workforce planning[5] .The contribution of nurses and allied health professionals is also fundamental. Global analyses highlight the adaptability of nursing practice to telehealth models and the growing demand for structured training and support systems[6]. Regionally, community-based telemedicine initiatives—particularly in Asia—illustrate how locally tailored programs can mitigate infrastructure challenges through stakeholder engagement and capacity building[7]. Despite these benefits, barriers persist. Evidence from global systematic reviews reveals that limited digital infrastructure, unclear reimbursement policies, and organizational resistance hinder wider implementation[8]. Commentaries in major medical journals caution that while telemedicine improves convenience, it may inadvertently widen inequalities unless issues of digital literacy and access are actively addressed[9]. Moreover, scholars emphasize that the rapid expansion of telemedicine—accelerated by global health crises—requires rigorous evaluation of safety, effectiveness, and patient-centered outcomes to ensure equitable integration into modern healthcare systems[10]. Collectively, these findings position telemedicine as both a practical and philosophical evolution in medicine: a tool that promises broader access, improved continuity, and efficiency, yet demands continued research to strengthen evidence, equity, and trust.

Methodology:

Study Design:

This is cross-sectional study done to assess the relationship between patients' perceptions of telehealth usability and their trust in physicians.

Participants and Setting:

Participants were adult patients who had used telehealth services within the last six months.

Inclusion criteria:

It included people with age ≥18 years. People have at least one telehealth consultation with a doctor and those who provided consent.

Exclusion criteria:

People with age less than 18 years and those who does not agree to fill consent form.

Data Collection:

Data were collected using an online questionnaire by including demographic questions along with the two validated scales Telehealth Usability Questionnaire TUQ and Trust in Physician Scale TIPS.

Ethical approval was obtained from the ethics committee of Liaquat college of medicine and dentistry [IRB/LCMD/307/2024] and informed consent was obtained from all participants before data collection.

Sample size:

OpenEpi (version 11) was used to estimate the sample size using characteristics from a prior study[11]. It was conducted by Khan et al. (2021). The necessary sample size was 365, assuming a prevalence of 61.35%, a 95% confidence level, a 5% margin of error, and a design effect of 1. We included 385 individuals, all of whom filled out the questionnaire and had their answers examined in order to increase accuracy and account for potential incomplete answers.

Result:

The study included 385 participants in total, of whom 118 (30.6%) reported using telehealth services and 267 (69.4%) did not (Table 1). The study population was 24.06 ± 4.15 years old on average. Telehealth users (24.57 ± 4.66 years) and non-users (23.83 ± 3.90 years) did not differ significantly in age ($p = 0.109$). Both groups' gender distributions were similar ($p = 0.945$), with 48.3% of telehealth users being men and 48.7% not using it.

Frontier in Medical & Health Research

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Telehealth use was statistically significantly correlated with education level (p = 0.001). The majority of participants who used telehealth had intermediate education (53.4%) and a bachelor's degree (37.3%). Additionally, there was a significant correlation between income and telehealth use (p = 0.035), with a larger percentage of users falling into the $150,000–200,000 income range than non-users (20.3% vs. 10.9%). By residence, there was no discernible difference (p = 0.160).

Smartphones accounted for 91.5% of the telehealth users' access, with tablets (4.2%), laptops (2.5%), and landlines (1.7%) following closely behind. In terms of internet quality, 42.4% of respondents said their connection was acceptable, 34.7% said it was decent, and 13.6% said it was great. The most popular language among users was Urdu (51.7%), followed by English (45.8%).

Table-1: Comparison of participants charactersitics in relation to Telehealth use

		Telehealth services Use		Total	p-value
		Yes	No		
		118	267	385	
Age		24.57±4.66	23.83±3.90	24.06±4.15	0.109
Gender	Male	57(48.3%)	130(48.7%)	187	0.945
	Female	61(51.7%)	137(51.3%)	198	
Education	No formal education	0(0%)	20(7.5%)	20	0.001
	Primary	0(0%)	1(0.4%)	1	
	Secondary	2(1.7%)	19(7.1%)	21	
	Inter	63(53.4%)	140(52.4%)	203	
	Bachelors	44(37.3%)	80(30%)	124	
	Master	9(7.6%)	7(2.6%)	16	
Income	50,000-100,000	33(28%)	86(32.2%)	119	0.035
	150,000-200,000	24(20.3%)	29(10.9%)	53	
	250,000-300,000	4(3.4%)	10(3.7%)	14	
	Above 300,000	14(11.9%)	18(6.7%)	32	
	Prefer not to say	43(36.4%)	124(46.4%)	167	
Residence	Rural	9(%)	38(%)	47	0.160
	Semi Urban Area	25(%)	52(%)	77	
	Urban	84(%)	177(%)	261	
Device used for Tele health	Landline Phone	2(1.7%)	-	2	-
	Laptop/Computer	3(2.5%)	-	3	
	Smartphone	108(91.5%)	-	108	
	Tablet	5(4.2%)	-	5	
Quality of your Internet	Excellent	16(13.6%)	-	16	-
	Good	50(42.4%)	-	50	
	Fair	41(34.7%)	-	41	
	Poor	8(6.8%)	-	8	
	Very Poor	3(2.5%)	-	3	
Language Preference	Urdu	61(51.7%)	-	61	-
	English	54(45.8%)	-	54	

Frontier in Medical & Health Research

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	Mixed (Urdu+ English)	2(1.7%)	-	2	
	Pashto	1(0.8%)	-	1	

A total of 118 telehealth users were evaluated using the Anderson and Dedrick Trust in Physician Scale (TIPS). The mean TIPS score was 3.32 ± 0.49 overall. The two items with the highest mean scores were following medical advice (3.52 ± 0.99) and believing doctor's remarks (3.65 ± 1.11). Concerns about privacy (3.18 ± 1.16) and questioning opinions (2.66 ± 1.01) received lower scores (Table 2).

Volume 3, Issue 10, 2025

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Table-2: Anderson and Dedrick Trust in Physician Scale (n=118)

Sn	Questions	1	2	3	4	5	Average Points
1	I doubt that my doctor really cares about me as a person	22(18.64%)	17(14.41%)	20(16.95%)	38(32.20%)	21(17.80%)	3.16±1.38
2	My doctor is usually considerate of my needs and puts them first	4(3.39%)	16(13.56%)	26(22.03%)	60(50.85%)	12(10.17%)	3.50±0.96
3	I trust my doctor so much I always try to follow his/her advice	5(4.24%)	9(7.63%)	42(35.59%)	43(36.44%)	19(16.10%)	3.52±0.99
4	If my doctor tells me something is so. then it must be true	8(6.78%)	10(8.47%)	22(18.64%)	53(44.92%)	25(21.19%)	3.65±1.11
5	I sometimes distrust my doctor's opinion and would like a second one	12(10.17%)	45(38.14%)	38(32.20%)	17(14.41%)	6(5.08%)	2.66±1.01
6	I trust my doctor's judgments about my medical care	5(4.24%)	11(9.32%)	37(31.36%)	50(42.37%)	15(12.71%)	3.50±0.97
7	I feel my doctor does not do everything he/she should for my medical care	15(12.71%)	28(23.73%)	34(28.81%)	29(23.58%)	12(10.17%)	2.95±1.18
8	I trust my doctor to put my medical needs above all other considerations when treating my medical problems	5(4.24%)	15(12.71%)	40(33.90%)	39(33.05%)	19(16.10%)	3.44±1.04
9	My doctor is a real expert in taking care of medical problems like mine	4(3.39%)	12(10.17%)	37(31.36%)	44(37.29%)	21(17.80%)	3.55±1.00
10	I trust my doctor to tell me if a mistake was made about my treatment	8(6.78%)	13(11.02%)	39(33.05%)	42(35.59%)	16(13.56%)	3.38±1.06
11	I sometimes worry that my doctor may not keep the information we discuss totally private	8(6.78%)	28(23.73%)	35(29.66%)	28(23.73%)	19(16.10%)	3.18±1.16
Total							**3.32±0.49**

The Telehealth Usability Questionnaire (TUQ) was used to assess telehealth usability (Table 3). The TUQ score was 99.05 ± 29.29 overall. High agreement was found on items pertaining to intention to reuse ("I would use telehealth system again" – mean 5.00 ± 1.99) and ease of use ("The system is simple and easy to understand" – mean 5.19 ± 1.89). Perceived equivalency to in-person visits showed lower agreement (mean 4.14 ± 2.07).

Higher trust in doctors was linked to better telehealth usability experiences, according to a significant positive correlation between TUQ and TIPS scores (Pearson's $r = 0.450$, $p < 0.001$).

Volume 3, Issue 10, 2025

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Table-3: Response of Telehealth usability questionnaire for study participants (n=118)

Sn	Questions	1(SD)	2(DA)	3(SWD)	4(NAND)	5(SWA)	6(A)	7(SA)	Average Points
1	Telehealth improves my access to healthcare services	23(19.49%)	10(8.47%)	-	28(23.73%)	-	42(35.59%)	15(12.71%)	4.34±2.14
2	Telehealth saves me time traveling to a hospital or specialist clinic	15(12.71%)	17(14.41%)	-	21(17.80%)	-	29(24.58%)	36(30.51%)	4.74±2.22
3	Telehealth provides for my healthcare need	15(12.71%)	14(11.86%)	-	37(31.36%)	-	33(27.97%)	19(16.10%)	4.42±2.01
4	It was simple to use this system	9(7.63%)	16(13.56%)	-	24(20.34%)	1(0.85%)	39(33.05%)	29(24.58%)	4.91±1.99
5	It was easy to learn to use the system	11(9.32%)	12(10.17%)	-	24(20.34%)	-	38(32.20%)	33(27.97%)	5.00±2.02
6	I believe I could become productive quickly using this	9(7.63%)	8(6.78%)	-	34(28.81%)	-	36(30.51%)	31(26.27%)	5.03±1.87
7	The way I interact with this system is pleasant	11(9.32%)	6(5.08%)	-	35(29.66%)	-	32(27.12%)	34(28.81%)	5.03±1.92
8	I like using the system	10(8.47%)	7(5.93%)	-	31(26.27%)	-	46(38.98%)	24(20.34%)	5.02±1.84
9	The system is simple and easy to understand	10(8.47%)	6(5.08%)	-	29(24.58%)	-	37(31.36%)	36(30.51%)	5.19±1.89
10	This system is able to do everything I would want it to be able to do it	10(8.47%)	11(9.32%)	-	38(32.20%)	-	29(24.58%)	30(25.42%)	4.81±1.94
11	I can easily talk to the clinician using telehealth system	8(6.78%)	12(10.17%)	-	35(29.66%)	-	33(27.97%)	30(25.42%)	4.92±1.90
12	I can hear the clinician clearly using telehealth system	11(9.32%)	12(10.17%)	-	31(26.27%)	-	30(25.42%)	34(28.81%)	4.89±2.02
13	I felt I was able to Express myself affectively	8(6.78%)	18(15.25%)	-	38(32.20%)	-	22(18.64%)	32(27.12%)	4.68±1.99
14	Using telehealth system, I can see clinician as well as if we met in person	14(11.86%)	23(19.49%)	-	36(30.51%)	1(0.85%)	23(19.49%)	21(17.80%)	4.19±2.05
15	I think the visits provided over telehealth system are same as in-person visits	17(14.41%)	19(16.10%)	-	40(33.90%)	1(0.85%)	19(16.10%)	22(18.64%)	4.14±2.07

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

16	Whenever I made mistakes using telehealth system, I recover is easily and quickly	13(11.02%)	16(13.56%)		47(39.83%)	1(0.85%)	21(17.80%)	20(16.95%)	4.27±1.93
17	The system gave error messages that clearly told me how to fix a problem	12(10.17%)	19(16.10%)	1(0.85%)	42(35.59%)	2(1.69%)	27(22.88%)	15(12.71%)	4.22±1.90
18	I feel comfortable communicating clinical using telehealth system	12(10.17%)	13(11.02%)	1(0.85%)	40(33.90%)	-	27(22.88%)	25(21.19%)	4.56±1.97
19	Telehealth is a acceptable way to receive healthcare services	9(7.63%)	11(9.32%)	-	37(31.36%)	1(0.85%)	29(24.58%)	31(26.27%)	4.87±1.92
20	I would use telehealth system again	11(9.32%)	10(8.47%)	-	28	1(0.85%)	34(28.81%)	34(28.81%)	5.00±1.99
21	Overall I am satisfied with this telehealth system	9(7.63%)	11(9.32%)	-	35(29.66%)	-	35(29.66%)	28(23.73%)	4.89±1.90
Total									**99.05±29.29**

Frontier in Medical & Health Research

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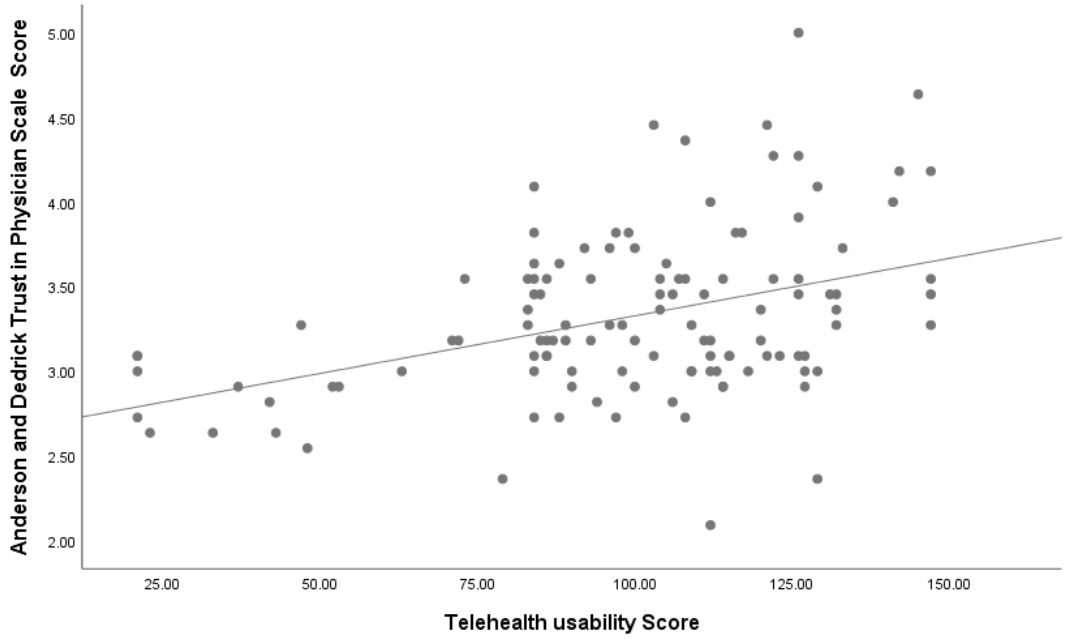

Pearson correlation coefficient= 0.450, **p-value**<0.001

Female participants had significantly higher TIPS scores (108.18 ± 26.75 vs. 89.30 ± 28.96; p = 0.013) and TUQ scores (3.44 ± 0.49 vs. 3.20 ± 0.46; p < 0.001) than male participants, according to subgroup analyses (Table 4). TIPS scores were substantially correlated with educational status (p = 0.037), with those with intermediate-level education having the highest mean scores. TIPS ratings were also substantially correlated with employment status (p < 0.001), with those who were unemployed reporting higher levels of trust than those who were working. Age group, income level, and place of residence did not significantly affect TUQ or TIPS scores.

Table-4: TUQ and TIPS score comparison in relation to patients charactersitics

		TUQ Score	TIPS score
		118	118
Age (Years)	18-30	3.34±0.50	99.30±30.02
	31-40	3.13±0.42	96.11±19.30
p-value		**0.468**	**0.309**
Gender	Male	3.20±0.46	89.30±28.96
	Female	3.44±0.49	108.18±26.75
p-value		**<0.001**	**0.013**
Education	Secondary	3.32±0.32	92.50±27.58
	Inter	3.42±0.49	101.25±27.07
	Bachelors	3.24±0.51	97.73±34.30
	Master	3.04±.14	91.67±18.26
p-value		**0.569**	**0.037**
Income	50,000-100,000	3.17±0.43	96.67±27.15
	150,000-200,000	3.30±0.45	101.08±23.13
	250,000-300,000	3.23±0.67	106.25±24.07
	Above 300,000	3.53±0.43	97.36±40.20
	Prefer not to say	3.39±0.54	99.65±31.32
p-value		**0.914**	**0.074**

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Employment	**Employed**	3.04±0.33	94.94±22.19
	Unemployed	3.42±0.50	100.53±31.42
p-value		**0.215**	**<0.001**
Residence	**Rural**	3.48±0.42	93.44±45.79
	Semi Urban Area	3.17±0.23	104.60±21.16
	Urban	3.35±0.55	98.01±29.40
p-value		**0.494**	**0.123**

Discussion:

The study utilized two validated tools, the Anderson & Dedrick Trust in Physician Scale (TIPS) and the Telehealth Usability Questionnaire (TUQ), to assess the relationship between patients' trust in their physicians and the usability of telehealth services. The results obtained from these tools offered insightful information on the variables influencing telehealth adoption.

According to our findings, telehealth adoption was highly influenced by income and education. Interestingly, participants with intermediate or higher education were more likely to have used telehealth services than those with no formal education or only primary schooling. Similarly, The results also indicated a significant association between telehealth use and household income, suggesting that individuals from higher income groups were more likely to use telehealth services. In contrast, our sample's adoption of telehealth did not significantly correlate with age, gender, or whether they lived in an urban or rural area.

These trends are consistent with other data: U.S. studies revealed that patients with insurance and college degrees used telehealth more frequently[12]. Similarly, Fisher and Magin (2022) also observed that those in the United States who had private insurance and greater education were more likely to use virtual healthcare services, highlighting the ways in which socioeconomic status facilitates access to telehealth[13]. Sayed et al. (2025) also found that individuals with higher levels of education also showed stronger acceptance and usability of telehealth platforms, primarily as a result of their increased technological familiarity and digital literacy[14]. Collectively, these results imply that socioeconomic status specifically, income and education continues to influence telehealth engagement and accessibility across different settings.

Telehealth Usability Questionnaire (TUQ) proved valuable in capturing the multidimensional aspects of usability. Considering the results of the study, participants generally had a favorable opinion of telehealth services, with most expressing increased access to medical care and system satisfaction. The system's ease of use and learning (mean score 5.00±2.02), productivity (5.03±1.87), and enjoyment of interacting with the system (5.03±1.92) were the highest-rated items. Positive responses were also given to communication-related features like hearing the clinician clearly (4.89±2.02) and being able to communicate with them easily (4.92±1.90), demonstrating how well the platform works to promote patient-clinician interaction. These findings are consistent with previous studies, such as Parmanto et al. (2016), and more recent research from Saudi Arabia and the United States, which also reported high usability, satisfaction, and communication quality when using telehealth platforms (Alhodaib et al., 2022; Alqarni et al., 2025)[15,16,17].

Even with these encouraging results, some areas received less support. When comparing telehealth and in-person visits, the items with the lowest ratings were the belief that telehealth visits are equivalent to in-person visits and the perception that seeing the clinician is just as important as seeing them in person (4.19±2.05). Similar concerns were found in other trials,where despite high usability and satisfaction,many patients still preferred in-person visits for certain aspects of care[18]. Overall the high mean score (99.05±29.29) indicates that telehealth is widely accepted as a viable and efficient method of delivering healthcare. Despite reservations about its equivalency to conventional in-person consultations, these results are in line with earlier research showing that telehealth increases patient convenience, saves time, and improves access[19].

The Anderson and Dedrick Trust in Physician Scale (TiPS) was used in this study to evaluate patients' trust in their doctors. The average trust score across all patients was 3.32. ± 0.49, suggesting a fair to high degree of faith in the patient-physician connection. On the same scale, earlier studies found mean values between 3.0 and 3.8, indicating that, in general, patients maintain

Frontier in Medical & Health Research

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this rating. Though they have faith in their doctors, some aspects of their treatment might be better (Anderson & Dedrick, 1990; Hall et al., 2002)[20].

The questions that measured the physician's competence and authority had high scores. For instance, patients agreed strongly with the notion that whatever their doctor says must be accurate (mean = 3.65 ± 1.11). In a similar vein, patients gave their physicians a high rating for their expertise in treating their diseases (mean = 3.55 ± 1.00), and a lot of them had faith in their doctor's therapy choices (mean = 3.50 ± 0.97). These findings are consistent with earlier research that highlights competence and professional skills as essential components of physician trust, with previous studies reporting mean values ranging from 3.4 to 3.8 on a 5-point scale, showing that patients firmly believed that a doctor's technical proficiency and ability were the cornerstones of confidence (Hall et al., 2002; Pearson & Raeke, 2000)[21].

The interpersonal aspect of trust also received a good rating. More than half of the respondents felt that their doctor was attentive to their demands (mean = 3.50 0.96), and a large number said that they complied with their doctor's advice (mean = 3.52 ± 0.99). These replies emphasize the importance of empathy, compassion, and patient-centered conduct in establishing and maintaining trust. Mechanic and Meyer (2000) similarly reported that interpersonal trust measures such as physician attentiveness, listening, and responsiveness were rated highly, with mean values typically ranging from 3.4 to 3.7 on a 5-point scale, confirming that maintaining patient trust depends heavily on the relational aspect of care[22].

However, a few problems were discovered. The item about getting a second opinion had the lowest mean score (2.66 ± 1.01), indicating that many patients still have reservations about their doctor's assessment. Concerns about confidentiality were also brought to the forefront, as 29.6% of patients expressed concern that their data might not be kept private (mean = 3.18 1.16). Transparency also proved to be a less robust aspect. In line with previous evidence that patients are frequent, only 35.6% of participants had a high level of confidence in their doctor's ability to reveal treatment mistakes (mean = 3.38 ± 1.06). wary of doctors' openness to acknowledging errors (Blendon et al., 2002)[23].

Additionally, about one-quarter of respondents thought their doctor doesn't always do all he can for their treatment (mean = 2.95 1.18), which may highlight unmet expectations or communication failures. Collectively, these findings point to problems with integrity-related issues like honesty, error disclosure, and confidentiality, even though competence and compassion are highly valued. This is consistent with the three-dimensional trust model in doctors, which comprises benevolence, competence, and integrity (Pearson & Raeke, 2000)[24].

Conclusion:

In summary, this study highlights that telehealth is widely accepted for its accessibility, convenience, and usability, while patients' trust in their doctors is largely rooted in the belief that they are skilled and genuinely care for them. Even so, issues with integrity, transparency, and secrecy continue to exist. It is crucial to close these disparities and enhance fair access for people from all socioeconomic backgrounds. Strengthening both telehealth platforms and physician trust factors can make patient-physician relationships more efficient and long-lasting.

Recommendations:

Improve digital literacy programs to to make telehealth more accessible to undereducated and low-income populations. Integrate continuous training for healthcare providers on maintaining trust and transparency in virtual consultations. Strengthen confidentiality safeguards and communication protocols to build greater patient confidence. Develop policies that ensure equitable telehealth access across socioeconomic strata. Encourage the use of hybrid care models that combine in-person visits and telemedicine to strike a balance between patient comfort and trust and accessibility.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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